

ing the afternoon of the 29th. The sloop "Gris" was driven ashore on Corinthian Point in Boston Harbor during a squall on the above date.

Pittsburg, Pa.: light rain prevailed from 1.20 to 3 p. m. on the 30th; at 4.40 p. m. a severe thunder-storm set in from the southwest and continued till 6.15 p. m.; heavy rain, with hail, occurred from 5.10 to 5.30 p. m., the rainfall amounting to 1 inch, most of which fell in twenty minutes; the wind reached a velocity of thirty-six miles an hour from the northwest; the damage done to various kinds of property is estimated at \$70,000.

Hartford, Conn.: a severe hail storm on the afternoon of the 31st caused great damage to corn, tobacco, and other crops in South Glastonbury and neighboring localities. Large trees were blown down and the roads were badly washed.

New London, Conn.: "The Day" of August 1st states the storm of July 31st was among the severest that has been

experienced at New London in many years, and caused damage throughout the city and in other portions of the state; numerous objects were struck by lightning. At Hartford the storm was accompanied by hail which caused much damage to crops in that vicinity.

New Haven, Conn.: during the thunder-storm which began at 2.50 and ended at 4.30 p. m. of the 31st, several buildings and trees were struck by lightning.

WATER-SPOUTS.

Capt. J. Meikle, of the bark "Ashantee," reports having observed a large water-spout July 9th, at 8 a. m., in N. 38° 40', W. 68° 31', during the prevalence of a heavy thunder-storm, with hard sw. squalls and heavy rain from 2 a. m. till noon.

Capt. G. Steuger, of the s. s. "Leerdam," reports: "June 21st, 4.15 p. m., in N. 41° 02', W. 60° 23', observed large water-spouts which moved from sw. to ne."

COTTON REGION REPORTS.

In the following table are given the means of the maximum and minimum temperatures, and the average rainfall for the cotton-belt districts during the month. For the purpose of comparison the means for the five preceding years are also given.

The rainfall for the districts of Galveston and Little Rock differs but slightly from the average; that for the district of Memphis is 1.06 below the average, while in the other districts the rainfall is excessive. The excess for the districts of Augusta, Atlanta, Montgomery, and Savannah is very large, that for Augusta amounting to 7.54 inches. In the last-named district reports from twelve stations give an average of 11.49 inches, which is nearly three times as great as the normal precipitation as determined from the cotton-region observations of the last five years; the average for the Atlanta district (reports from thirteen stations) is more than double the normal, while the excess for the Montgomery district is nearly as great.

The means of the maximum and minimum temperatures in all districts are generally normal or slightly above.

Temperature and rainfall data for the cotton districts, July.

Districts.	Rainfall.			Temperature.								Extremes for July, 1887.	
	Average for July of five preceding years.	Average for July, 1887.	Departures.	Maximum.				Minimum.					
				Mean for July of five preceding years.	Mean for July, 1887.	Departures.		Mean for July of five preceding years.	Mean for July, 1887.	Departures.			
	Inch.	Inch.	Inch.	°	°	°		°	°	°		Max.	Min.
New Orleans.....	4.26	5.03	+ 0.77	92.9	92.4	- 0.5		73.1	71.7	- 1.4		103	61
Savannah.....	5.74	8.65	+ 2.91	92.3	93.0	+ 0.7		72.0	72.7	+ 0.7		105	56
Charleston.....	6.36	6.99	+ 0.63	91.8	92.3	+ 0.5		70.5	72.4	+ 1.9		102	53
Atlanta.....	4.01	9.77	+ 5.76	90.2	90.5	+ 0.3		68.7	71.1	+ 2.4		106	58
Wilmington.....	3.37	6.35	+ 2.98	90.7	92.5	+ 1.8		68.9	71.7	+ 2.8		111	56
Memphis.....	2.88	2.82	- 0.06	90.3	92.5	+ 2.2		68.5	70.1	+ 1.6		106	49
Galveston.....	2.09	2.07	- 0.02	95.5	95.5	0		72.7	74.0	+ 1.3		105	61
Vicksburg.....	5.10	5.47	+ 0.37	92.0	92.7	+ 0.7		71.4	72.5	+ 1.1		102	55
Montgomery.....	4.34	8.47	+ 4.13	91.7	92.4	+ 0.7		69.6	71.9	+ 2.3		101	53
Augusta.....	3.95	11.49	+ 7.54	92.4	92.5	0		70.1	71.8	+ 1.7		110	63
Little Rock.....	2.59	2.38	- 0.21	92.8	93.2	+ 0.4		68.1	68.5	+ 0.4		105	56
Mobile.....	3.78	5.39	+ 1.61	93.5	93.3	- 0.2		70.4	70.0	- 0.4		105	58

INLAND NAVIGATION.

FLOODS.

Raleigh, N. C.: during a heavy thunder-storm on the 7th 4.90 inches of rain fell from 10 to 11.30 p. m. Reports from the surrounding neighborhood show that this phenomenal rainfall was not general; at the signal office, only two miles distant, the rainfall measured but 1.79 inches. Portions of the dam of the water-works were washed out, and the crops lying in the storm's area were somewhat damaged.

Nogales, Pima Co., Ariz.: on the afternoon of the 7th a remarkably heavy rain storm occurred. Streets were flooded and dams and bridges washed away. Washouts occurred on the Sonora Railroad, causing delay of trains. On the afternoon of the 13th another heavy rain storm occurred. It is reported that on the mountains to the southwest of Sonora there was a "cloud burst," which in a short time flooded a portion of Sonora, washing away a number of houses.

Fort Apache, Ariz.: during the prevalence of a thunder-storm from 5.20 to 8.10 p. m. on the 8th, a "cloud burst" occurred on the east fork of the White River, in the mountains east of station. A volume of water three feet deep came down the canyon, carrying on its crest large trees, etc.; the water subsided in about two hours.

The "Salt Lake Herald" of the 13th states:

FILLMORE, UTAH, July 11.—Last evening a flood again devastated Fillmore and the surrounding country. The greatest damage was done in the mountains east of this place. Three saw-mills, with logs and lumber aggregating thousands of feet, were swept entirely away. Half of a large herd of sheep

was lost, the herders narrowly escaping with their lives. The damage done will materially affect the whole community.

The Saint Louis "Globe-Democrat" of the 15th contained the following:

DENVER, COLO., July 14.—A terrific cloud-burst occurred in Tucker Canyon, near Golden, twenty miles from Denver, this afternoon. The canyon was full of campers, ore-haulers, etc. A slight rain storm succeeded peals of thunder, and suddenly a wave nearly twenty feet high swept down the narrow canyon, which for weeks had been completely dry. Everything was swept before it. The sides of the gulch, which is only sixty feet wide, were swept away, as were also the trail and carriageway for miles up the canyon. Those who were caught out, so far as is known, left their teams and fled to the mountains. All the latter part of the afternoon people have been walking into Golden from the hills. They report the loss of their teams and vehicles, and all give exciting accounts of their narrow escapes from death. They fear that many lives have been lost, as many people who went up into the mountains have not yet been heard from.

The huge wave in the canyon was the result of a cloud-burst, which may have occurred far up in the canyon. The loss to ranchmen in the valley has been heavy.

The Cheyenne, Wyo., "Daily Leader" of the 16th contained the following:

ALBUQUERQUE, N. MEX., July 16.—A special to the "Democrat" from Benson, Ariz., says the heavy rains of the past few days have caused serious washouts on the New Mexico and Arizona and Sonora railroads, and it will be three or four weeks before trains can go through to Nogales. Water has run down from the mountains in large volumes, drowning considerable stock in the valleys.

San Francisco, Cal.: the first mails from the East since the 16th arrived during the night of the 18th, the delay having

been caused by washouts on both the Central and Southern Pacific routes.

Baltimore, Md.: nearly three inches of rain fell during the storm of the 21st, and the greater part of this amount fell between 10.30 a. m. and noon. Damage to the extent of several thousand dollars was done by the flooding of sewers, etc.

Great Barrington, Berkshire Co., Mass.: the heavy rainfall on the morning of the 22d caused Green River to overflow. At Alford, in this county, a bridge was washed away; considerable damage was done at other points.

Chatham, Columbia Co., N. Y.: the rainfall on the 23d in some portions of this county was remarkably heavy. A large amount of damage was done to bridges and roadways, and in many places fields were inundated and the crops ruined.

Philadelphia, Pa.: on the 23d and 24th the heavy rainfall (about four inches) caused much damage in this city to streets and sewers.

Menands, Albany Co., N. Y.: to the east and south of Albany, destructive freshets resulted from the heavy rains which occurred during the 23d-24th, causing much damage to property. In Columbia county many dwellings were washed away.

Orange, Franklin Co., Mass.: the freshet of the 25th was the most destructive that has occurred here for many years. A number of factories had their first floors flooded.

Dover, Strafford Co., N. H., 25th: all rivers in this part of the state are unusually high. At New Market, Rockingham, Co., a part of a dam of the New Market Cotton Mill was carried away, together with some derricks and engines.

Wellsborough, Tioga Co., Pa.: on the 25th and 26th 4.15 inches of rain fell at this place; this is the heaviest rainfall that has occurred during the last eight years. Cellars were filled with water, bridges carried away, and in many places railroad tracks were washed out, causing delay of trains.

Binghamton, Broome Co., N. Y.: the heavy rains on the night of the 25-26th caused a freshet at Deposit, in this county. All of the smaller bridges in that vicinity were washed away. The water about the railroad buildings was two feet deep.

Coatesville, Chester Co., Pa.: on the 26th heavy rains caused a washout on the Pennsylvania Railroad, about half a mile west of this place. Reports from Susquehanna county state that numerous bridges in that county were washed away. At Red Rock, Luzerne Co., about two thousand feet of railroad track were washed out.

Reading, Berks, Co., Pa.: the heavy rainfall of the 26th flooded a large number of basements and cellars in this city. Numerous washouts occurred on the railroads in the surrounding country, causing delay of trains.

Greenfield, Franklin Co., Mass.: the heavy rainfall of the 26th caused a large number of washouts and land-slides between Miller's Falls and Erving, in this county.

Philadelphia, Pa.: the rainfall on the night of the 26-27th caused a large amount of damage at Falls of the Schuylkill, where, on many streets, the lower floors of houses were submerged. The damage is estimated at \$100,000. At Manayunk the streets were washed out and houses and mills were flooded.

Contoocook, Merrimack Co., N. H.: the Warren and Contoocook rivers began to overflow on the 27th. The high water at Contoocook caused partial suspension of business.

Augusta, Ga.: the heavy rains at the close of the month caused the Savannah River to rise to a height which has not been equaled since 1865; the river reached its greatest height,

34.5 feet, about 9 a. m. of the 31st and remained stationary until 3 p. m.; quantities of drift-wood were carried past the city by the rapid current, and fears were entertained for the safety of the bridges which cross the river. A considerable portion of the city was inundated, and in some places the water was ten feet deep. Travel on railroads was interrupted and the operations of mills were suspended. The rainfall on the 29th amounted to 4.50 inches, which is the largest daily rainfall on the records of the Signal Office at this place. In but three instances since 1840 has the river reached a greater height than during the freshet of July, 1887, viz.: in 1840, 37.3 feet; 1852, 36.8 feet; and 1865, 36.4 feet. During the freshet of 1864 the river reached a height of 33.8 feet.

Forsyth, Monroe Co., Ga.: from the 27th to 31st about 9 inches of rain fell at this place; this remarkably heavy rainfall was very destructive to crops in this part of the state.

Wetumpka, Elmore Co., Ala.: owing to recent heavy rains the Coosa and Alabama rivers were very high on this date. Hundreds of acres of corn land have been submerged.

Milledgeville, Baldwin Co., Ga.: the precipitation for the month, 16.09 inches, is unprecedented at this station for the month of July; the first rainy season occurred from the 4th to the 12th, when 5.75 inches of rain fell; and the second from the 27th to the 31st, when 9.98 inches of rain fell. This latter rainfall caused a freshet similar to that in 1840. Great damage was done in this county to crops, bridges, fences, etc.

STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various river stations and the highest and lowest depths for July, 1887, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, July, 1887.

[Expressed in feet and tenths.]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La.	29.9	1	11.9	31	6.0	5.9
<i>Arkansas River:</i>						
Fort Smith, Ark.	22.0	10	7.0	26, 31	2.3	4.7
Little Rock, Ark.	23.0	14	6.3	31	2.4	3.9
<i>Missouri River:</i>						
Omaha, Nebr.	18.0	2, 3, 4	14.9	29, 31	10.3	4.6
Leavenworth, Kans.	20.0	2, 3	16.5	31	11.7	4.8
<i>Mississippi River:</i>						
Saint Paul, Minn.	14.5	20, 21, 24	2.9	31	2.3	0.6
La Crosse, Wis.	24.0	1, 2, 4	4.4	31	3.0	1.4
Dubuque, Iowa	16.0	1, 3, 4	4.5	29, 30, 31	2.7	1.8
Davenport, Iowa	15.0	4, 5	3.7	29, 30, 31	1.6	1.5
Keokuk, Iowa	14.0	7	2.9	31	1.4	1.5
Saint Louis, Mo.	32.0	5, 6	16.9	31	10.1	6.8
Calro, Ill.	40.0	5, 6, 7	16.2	31	8.8	7.4
Memphis, Tenn.	34.0	7	13.4	29, 30, 31	8.2	5.2
Vicksburg, Miss.	41.0	1	18.9	31	7.5	11.4
New Orleans, La.	13.0	1	7.2	29	3.2	4.0
<i>Ohio River:</i>						
Pittsburg, Pa.	22.0	21	6.9	30	1.5	5.4
Cincinnati, Ohio	50.0	1	8.1	22	4.3	3.8
Louisville, Ky.	25.0	1, 2	4.9	14, 24, 31	3.5	1.4
<i>Cumberland River:</i>						
Nashville, Tenn.	40.0	9	1.9	21, 28-31	0.9	1.0
<i>Tennessee River:</i>						
Chattanooga, Tenn.	33.0	10	5.6	20	1.9	3.7
<i>Monongahela River:</i>						
Pittsburg, Pa.	29.0	21	6.9	30	1.5	5.4
<i>Savannah River:</i>						
Augusta, Ga.	32.0	31	34.5	4	5.1	29.4
<i>Sacramento River:</i>						
Red Bluff, Cal.		1, 2, 3, 4	1.0	28, 29, 30, 31	0.6	0.4
Sacramento, Cal.		1, 2, 3	11.0	31	8.1	2.9
<i>Willamette River:</i>						
Portland, Oregon		1	23.5	31	12.5	11.0

ATMOSPHERIC ELECTRICITY.

AURORAS.

But few auroras were observed during July, and none of the displays reported were noted for brilliancy or extent of observation. The most extended displays of the month occurred on the nights of the 18-19th and 19th-20th; these were observed

principally from the Lake region eastward to the New England coast. The Signal Service observer on the summit of Mount Washington, N. H., reports: An auroral light was observed at 9.30 p. m. on the 18th, extending 20° east and west of the magnetic meridian; it very rapidly assumed the formation of an